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REGION 4
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4WD-*RPB*

SUBJ: Evaluation of Owens-Corning Fiberglass Corporation status under the RCRIS Corrective Action Environmental Indicator Event Code CA 750
EPA I.D. Number: SCD 003 349 982

FROM: Channing Bennett
North Permitting Section



THRU: Caron Falconer
Environmental Protection Agency Region 4
Chief, North Permitting Section
Waste Management Division

TO: Narindar Kumar
Environmental Protection Agency (EPA) Region 4
Chief, RCRA Program Branch
Waste Management Division

## I. PURPOSE OF MEMO

This memo is written to formalize an evaluation of Owens-Corning Fiberglass Corporation status in relation to the following corrective action event codes defined in the Resource Conservation and Recovery Information System (RCRIS):

1) Current Human Exposures Under Control (CA725),

2) Migration of Contaminated Groundwater Under Control (CA750).

Concurrence by the RCRA Programs Branch Chief is required prior to entering these event codes into RCRIS. Your concurrence with the interpretations provided in the following paragraphs and the subsequent recommendations is satisfied by dating and signing at the appropriate location within Attachment 1.

## II. HISTORY OF ENVIRONMENTAL INDICATOR EVALUATIONS AT THE FACILITY AND REFERENCE DOCUMENTS

This is the first evaluation for Owens-Corning Fiberglass Corporation for the CA 750 Environmental Indicator. Eight (8) reference documents used to prepare this EI is listed on page 7 of this EI.

## III. FACILITY SUMMARY

The Owens Corning Anderson Plant is located in Anderson County, South Carolina. The Owens Corning operates a glass fiber operation production facility The plant was constructed in 1951 and currently occupies 160 acres of land between Seed Tick Road (sometimes referred to as True Temper Road), Keys Street, Rear Flat Rock Road, and State Route 81.

The Anderson Plant produces glass fibers that are used in various applications. The raw materials used to make the glass include silicia, limestone, borates, fluorospar, clay, and trace amounts of other compounds including iron oxide, and salt cake. The materials are combined in a furnace, melted, and mixed and pullet into filaments of various dimensions. The Anderson plant has also produced resins and coatings, gelcoats, and alkyd resins for paint. The resin plant is presently being phased out.

A Consent Order (AOC) issued under Section 3008(h) (U.S. EPA Docket No. 89-34-R) was entered into between Owens Corning and the U.S. Environmental Protection Agency (EPA), on September 29, 1989. The AOC required Owens Corning to investigate and implement corrective action for nine (9) Solid Waste Management Units (SWMUs) identified by EPA and Owens Corning.

## IV. CONCLUSION FOR CA 750
**(Brief Outline of Issues Leading to an EI of YE, NO or IN)**

**Migration of Contaminated Groundwater is Under control for CA 750 based on the following conclusions:**

**Groundwater:** Base on the vast amount of groundwater monitoring data, the migration of contaminated groundwater appears to have stabilized. As discussed in Question 2, the limited frequency of detections of metals and fluoride in groundwater at the site provides strong evidence that these compounds have not migrated significantly from their historic sources. The historic sources of these compounds have been removed through process modification ( including removal of all alloying operations from the facility) and over excavation of impacted soil, therefore there is no reason to believe that migration of these constituents would become a concern in the future.

Historic and current data indicate that VOCs in groundwater have not been identified in the monitoring wells along the downgradient boundary of the facility. VOCs in groundwater are generally confined in the following localized areas beneath the site. The highest concentration of VOCs continues to be limited to a zone of shallow groundwater at SWMU 9. This zone is located in the southwestern portion of the site, approximately 1,800 feet from the potential discharge point at Besty Creek. Groundwater monitoring data beneath and downgradient of this location indicates that contaminated groundwater has not migrated. However, additional investigation of groundwater downgradient of SWMU 9 is necessary to confirm that groundwater contaminated with high levels of VOCs remains in the original area of contamination.

VOCs are also located in the shallow overburden material downgradient of the former SWMU 1 immediately north of Betsy Creek. Groundwater monitoring data downgradient of this location does not indicate that these constituents have migrated to the monitoring points located along the downgradient property line.

A localized zone of VOCs is present in bedrock at MW-15, located within the northern section of the Owens Corning facility. Groundwater monitoring data downgradient of this location (MW-25 and MW-16) does not indicate that these constituents have migrated to downgradient monitoring points.

The current groundwater data suggest that the migration of contaminated groundwater at the Owens Corning facility is under control. Groundwater wells located along the downgradient boundary of the facility indicates that contaminated groundwater has not migrated offsite. Current data suggest that contaminated groundwater is contained in the identified areas of SWMU 9, SWMU 1 and the area of MW-15. Further investigation and continued monitoring of contaminated groundwater at the facility is recommended. Further investigation and continued monitoring of the contaminated groundwater will assure that the contaminated groundwater remains stabilized within the facilities boundary and verify areas of contaminated groundwater that may require corrective action. Based on the most current data, Yes is recommended for the EI 750.

**Surface Water:** Groundwater discharges to Betsy Creek downgradient in the northeastern portion of the site. The VOCs in groundwater discharged into Betsy Creek is likely to be insignificant based on the sediment and surface water data. The maximum concentration of each constituent in monitoring wells adjacent to Betsy Creek from 2001 and 2002 monitoring programs were evaluated to determine if these VOCs are present at concentrations less than 10 times the appropriate groundwater MCLs. Groundwater monitoring of the VOC plume migrating towards Betsy Creek can be represented by groundwater quality data from MW-11, MW-12 and MW-13, which are located proximal to and upgradient to Betsy Creek. These data provide a conservative evaluation of the potential significance to the VOC plume discharging to surface water. The data represent groundwater quality prior to further attenuation associated with migration to the discharge point and entry into the groundwater-surface water/sediment interaction zone.

Surface water data results indicate that VOCs discharge form groundwater to surface water would be expected to be insignificant for carbon tetrachloride, chlorobenzene, 1,2, DCA, PCE, and TCE ( all present at concentrations less than 10 times their respective MCL). 1,1 DCE and vinyl chloride concentration is only slightly above 10 times their respective MCL, therefore the groundwater concentrations discharged to Betsy Creek is considered insignificant (Reference 8).

The discharge of VOCs to Betsy Creek should be considered insignificant because of the following: 1) concentrations of VOCs in the creek are not above available Region IV screening criteria, 2) base on the volatile nature of VOCs they will not persist in surface water, 3) surface water data has not contained VOCs above the laboratory method detection limit since July 2000, 4) sediments data of Besty Creek indicates that VOCs are not accumulating in the creek, 5) VOCs do not bioaccumulate in fish and other aquatic organisms.

## IV. STATUS CODE RECOMMENDATION FOR CA 750

CA 750 Yes, applicable as of this date. The current human exposure under control will be updated as necessary upon discovery of new or contrary information.

Attachment: 1. CA 750: Migration of Contaminated Groundwater Under Control

**DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION**

**RCRA Corrective Action**
**Environmental Indicator (EI) RCRIS code (CA 750)**

**Migration of Contaminated Groundwater Under Control**

| | |
|---|---|
| **Facility Name:** | Owens Corning Fiberglass Facility |
| **Facility Address:** | Highway 81 South, Anderson, South Carolina |
| **Facility EPA ID #:** | SCD 003 349 982 |

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

**X** If yes - check here and continue with #2 below.

If no - re-evaluate existing data, or

If data are not available skip to #8 and enter "IN"(more information needed) status code.

## BACKGROUND

### Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

### Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

### Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

### Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

___X___ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Owens Corning (OC) operates a glass fiber production facility near the town of Anderson in Anderson County, South Carolina. Owens Corning has entered into a Consent Order (89-34-R) with the U.S. Environmental Protection Agency (EPA) under Section 3008(h) of RCRA. The consent order requires OC to perform a RCRA Facility Investigation (RFI) for nine solid waste management units (SWMUs) at the OC, Anderson Plant (Reference 1). Two sites, Site 1 - The Abandoned Sludge Lagoon and Site 5 - The Parts Stripping Drum Storage Pad have completed closure under the Site Stabilization Plan (Reference 2). The final RFI report has been submitted (Reference 3). The U.S. EPA Region IV has agreed with OC that Sites 2, 3, 4, 6, 7 and 8 require no further action (Reference 4).

Thirty-two permanent monitoring wells, 2 piezometers, and one temporary well were installed at the facility during the RFI. In addition, two existing wells were redeveloped. Seven of these monitoring wells (TW-series) were installed in 2001 to further delineate the presence/absence of VOCs in groundwater downgradient of SWMU 9 and in the northern portion of the OC Anderson site on the former Gladden property (Reference 5). Groundwater is present beneath the site in unconsolidated saprolite and fractured bedrock. Therefore the monitoring wells have been installed as shallow overburden wells, overburden monitoring wells screened at the top of the bedrock, and bedrock monitoring wells. These wells have been sampled on an annual basis during the RFI after they were installed per the requirements of the Consent Order. The groundwater samples have generally been analyzed for total metals, fluoride, and VOCs prior to 2002 and for VOCs only in 2002. Groundwater from select monitoring wells was also analyzed for biogeochemical indicator parameters in January and December 2002 to support an assessment of the level of natural attenuation occurring within the plume of VOCs.

Occurrence of Metals in Groundwater

Groundwater metals analyses at 35 monitoring wells during November 2001 indicate that metals do not constitute a significant concern at the OC Anderson site (Reference 5). These 2001 data are consistent with 10 years of historical data collected at the site. Based on these 2001 analyses, only two metals are present at concentrations above their Safe Drinking Water Act, Maximum Contaminant Levels (MCLs), and these detections are limited in nature: beryllium above its MCL in only three wells and chromium above its MCL in only one well.

- Beryllium is present during 2001 in upgradient monitoring well MW8 at 0.005 milligrams per liter (mg/L), at monitoring well MW7 within the OC facility at 0.025 mg/L, and at monitoring well TW-43 at 0.0041 mg/L on the former Gladden property that is now owned by OC. The location of wells MW8 and TW-43 suggests that the presence of this constituent is not associated with OC operations. The beryllium detected above its MCL at shallow monitoring well MW7 does not persist beneath or downgradient of this well location, providing evidence that this detect is most likely indicative of a very localized historic release from SWMU 9. Dissolved beryllium in groundwater has a low mobility and should not migrate downgradient of the historic release point. It should also be pointed out that in 1980 SWMU 9 was taken out of service and the soil within SWMU 9 was over-excavated to the water table to remove the historic source of metals. These actions on the part of OC removed the potential for on-going releases in this location, so these localized concentrations of beryllium would be expected to continue to attenuate over time.

- Chromium is present in on-site overburden monitoring well MW12 at 0.79 mg/L, which is above its MCL of 0.1 mg/L. The detection of chromium in shallow overburden well MW12, but not in any other wells in the immediate vicinity or in surface water within Betsy Creek, indicates that the presence of this constituent is limited in extent and does not pose a significant concern at the site. Dissolved chromium has a low mobility and should not persist downgradient of the historic release point. Chromium was also detected in the 2001 analyses at concentrations below its MCL in the northernmost shallow overburden well, TW-43 (0.023 mg/L), bedrock wells TW-40 (0.0011 mg/L) and TW-41 (0.045 mg/L) and the northern top of rock monitoring well MW26 (0.05 mg/L). These wells are all located north of Betsy Creek, and are hydraulically side-gradient to the OC facility.

A similar evaluation of other metals detected at the site, which are all at concentrations below their respective MCLs, provides further evidence that local sources that might affect groundwater quality but are not associated with OC operations are likely present hydraulically upgradient (to the north-northwest).

- Barium is present in all monitoring wells (including all upgradient wells), except bedrock well MW19, with the two highest concentrations detected in top of rock monitoring well MW26 (0.83 mg/L) and overburden well MW8 (0.63 mg/L) located along the south side of True Temper Road where groundwater flows to these wells from off-site areas to the northwest.

- The highest concentrations of lead in the bedrock are seen in TW-40 (0.0064 mg/L) and TW-41 (0.016 mg/L) which are located on the former Gladden property and TW-44 (0.021 mg/L), which is located on the north side of the site, south of True Temper Road; the only detection of lead in the top of rock monitoring wells is at MW26 (0.014 mg/L), and the highest lead concentrations in the overburden wells are at TW-43 (0.08 mg/L) and upgradient well MW8 (0.016 mg/L). All of these wells are located north of Betsy Creek (hydraulically separated from areas of the site used for OC operations).

Therefore, the presence of metals in groundwater at the OC Anderson site are considered under control.

Occurrence of Fluoride in Groundwater

November 2001 groundwater quality data at 35 monitoring wells indicates that fluoride does not constitute a significant concern at the OC Anderson site (Reference 5), as no concentrations were detected above the MCL for this constituent. As discussed previously, impacted soil/sediment was removed from the Abandoned Sludge Lagoon (Site 1), the Parts Stripping Drum Storage Pad (Site 5) and the Hydrofluoric Acid Neutralization Pit (Site 9), effectively removing potential historical sources from the site. Based on the limited presence of fluoride at the site, the stabilization efforts completed to date at SWMUs 1, 5 and 9 that have removed the historic sources of potential fluoride in groundwater, the presence of fluoride in groundwater at the OC Anderson site are under control.

Occurrence of VOCs in Groundwater

Current and historic groundwater quality data indicates that no VOCs are leaving the Owens Corning property. This is indicated by the fact that no site-related VOCs or related degradation products are present in monitoring wells located along the downgradient/cross gradient borders of the Anderson site (ALLOY, MW5, MW16, MW21, MW25, TW-40, TW-41, TW-42, TW-43) (References 5 and 6).

The 2001 groundwater monitoring program involved the analysis of VOCs at 35 monitoring wells, but this number of investigation points was decreased in the 2002 monitoring program to remove four upgradient monitoring wells (MW1, MW2, MW8, and MW23), which contained no detectable concentrations of site-related VOCs (Reference 5). The findings of the 2002 monitoring program indicated that, in addition to the nine downgradient perimeter wells that were non-detect for VOCs, four overburden monitoring wells, four top of rock monitoring wells and two bedrock monitoring wells located within the site contained no detectable concentrations of site-related VOCs. Further, monitoring well TW-45 only contained detectable concentrations of chloroform and bromoform and TW-46 only contained a detectable concentration of chloroform. Therefore, 21 of the 31 monitoring wells sampled and analyzed for VOCs in 2002 did not contain the site-related VOCs of potential concern above the laboratory detection limit.

The 2002 groundwater quality data for the 10 monitoring wells where VOCs were detected indicates that the following constituents have been detected in groundwater on-site above their respective MCLs (Reference 6).

| | | |
|---|---|---|
| Carbon Tetrachloride | Overburden | MW12 (0.013 mg/L) |
| | Top of Rock | MW20 (0.0073 mg/L), MW24 (0.0081 mg/L) |
| | Bedrock | MW27 (0.034 mg/L). |
| 1,1-DCE | Overburden | MW7 (45 mg/L), MW11 (0.63 mg/L), MW12 (0.35 mg/L) |
| | Top of Rock | MW13 (0.41 mg/L), MW20 (0.022 mg/L), MW24 (0.069 mg/L). |
| | Bedrock | MW15 (0.36 mg/L), MW19 (0.24 mg/L), MW22 (0.48 mg/L), MW27 (0.120 mg/L). |
| 1,2-Dichloroethane | Bedrock | MW27 (0.0069 mg/L). |
| 1,1,1-Trichloroethane | Overburden | MW7 (76 mg/L). |
| Tetrachloroethene | Bedrock | MW27 (0.0056 mg/L). |

These groundwater data are generally consistent with historical levels of VOCs in these monitoring wells. This site historical data indicates that the VOC concentrations in these 10 monitoring wells have cycled up and down over the past 10 years of monitoring, with no clear upward or downward trend being identified over time. It should be noted that throughout this 10 year monitoring period, these continue to be the only wells that show appreciable concentrations of VOCs, and that while these VOC concentrations fluctuate over time, VOCs have never been detected in any of the nine downgradient monitoring wells.

An evaluation of the groundwater VOC data supports an interpretation that dissolved VOCs are present in site groundwater in localized areas of the site, likely associated with historic releases from SWMU 1 and SWMU 9. This conceptual model differs from the focus at the site prior to 2002 where it was assumed that the majority of the dissolved VOCs in groundwater were associated with on-going releases from SWMU 9 and that these constituents were migrating off-site to the northeast. However, this historic interpretation is not consistent with the currently available data. The interpretation of these two on-site plumes, presented in the current site conceptual model (Reference 7), is based on the following key points:

- The most elevated concentrations of dissolved VOCs (1,1,1-TCA and 1,1-DCE) at the facility are restricted to shallow overburden well MW7 at SWMU 9. VOCs are not present in the top of rock and bedrock wells located at SWMU 9. This significant attenuation with depth suggests limited migration from this SWMU (historic concentrations of these constituents in the deeper wells immediately after well installation were most likely associated with the well installation procedures);

- As the plume of VOCs from SWMU 9 migrates to the north-northeast beneath Factory A, the VOCs may be attenuating naturally, according to the groundwater data from downgradient monitoring wells (overburden [TW-45], top of rock [TW-46, MW20, MW17] and bedrock [MW27]) and crossgradient monitoring wells (overburden [MW5] and top of rock [MW10 and MW17]) that show non-detectable concentrations of 1,1,1-TCA and 1,1-DCE. It should be noted that the location of monitoring wells TW-45 and TW-46 installed in 2001, which have no detectable concentrations of the primary VOCs of potential concern at the site, were selected to be located so as to provide downgradient monitoring of SWMU 9;

- The increased concentration of 1,1-DCE present in monitoring wells adjacent to the north side of Betsy Creek indicate a local source closer to

this area. If the VOCs in this area were associated with historic releases from SWMU 9, the VOC concentrations would have trended downward from SWMU 9 to this area, rather than the documented site conditions that indicate a drop in VOC concentrations in wells within the mid-plant area and then an increase in these wells further downgradient. The location of these monitoring wells north of Betsy Creek also indicates that they are beyond the hydraulic divide provided by Betsy Creek (consistent with the LeGrand-Heath interpretation of groundwater flow in the Piedmont) (Reference 7), providing further evidence that the VOCs in this area of the site are may not be associated with a historic release from SWMU 9;

- The likely source for VOCs in monitoring wells adjacent to the north side of Betsy Creek is the former SWMU 1 that was remediated through over-excavation to the top of the water table in 1995. The VOCs present in groundwater in this area appear to be residual concentrations associated with historic releases from SWMU 1.

The existence of two discrete historic VOC sources is corroborated by an evaluation of biogeochemical indicator parameter data obtained in January 2002 (Reference 7) and December 2002 (Reference 6). These indicator data also provide evidence of natural biological degradation in and immediately downgradient of the two suspected source areas. At SWMU 9, elevated concentrations of total organic carbon (TOC) that can be used as an electron donor by microorganisms to support their metabolic activity are noted. This carbon source stimulates the biological activity, which then consumes oxygen and nitrogen compounds within the formation to provide the electron acceptor necessary to support the biological activity. As this activity is stimulated, the preferential electron acceptors (oxygen, nitrogenous compounds) are consumed and conditions within the aquifer transition to more reducing conditions. As the oxygen is consumed, the facultative bacteria will use alternate electron acceptors to support their activity. This use of alternate electron acceptors is evidenced by manganese and iron being reduced to more soluble states (valence +4 to +3 for manganese and +3 to +2 for iron). Evidence that more reducing conditions may be developing at SWMU 9 can be seen in the increase in dissolved manganese and ferrous iron (II) at MW7. Additionally, the increase in chlorides at MW7 provides evidence that the VOCs may be degraded. As the VOCs migrate downgradient of SWMU 9, the carbon is consumed, though residual affects of the biodegradation are still evident in overburden well TW-45 where increased dissolved manganese and dissolved iron indicate these compounds are being used as alternate electron acceptors to support microbial activity. The increase in chlorides also indicates reduction of the VOCs. The affect of this biological

activity, combined with other attenuation mechanisms (adsorption, dispersion, advection and dilution) is that the 1,1,1-TCA and 1,1-DCE are attenuating prior to the groundwater reaching the monitoring wells downgradient of SWMU 9. The biogeochemical indicator data provide a similar signature at overburden monitoring well MW11. Where TOC is present, evidence of facultative bacteria capable of using alternate electron acceptors to support their metabolic processes can be seen in the increased dissolved manganese and ferrous iron concentrations. This phenomenon is less pronounced in the other wells adjacent to Betsy Creek. These data indicate that biodegradation may be providing an additional attenuation mechanism in these primary areas of VOCs at the OC site.

The presence of VOCs in bedrock well MW15 (screened at approximately 709 to 680 feet mean sea level [msl]) is difficult to assign to OC operations based on current groundwater flow conditions that indicate flow in this area is east-southeast, from off-site to the OC facility near Betsy Creek. Further, if the VOCs historically detected in the former Gladden well were associated with preferential fracture flow from the OC's property (as previously thought), VOCs would have been detected in the bedrock samples collected during the packer test conducted in 1992. However, the historic packer testing on the Gladden bedrock well indicated VOCs were only present in the top of rock margin (approximately 727 feet msl) where the well casing ended in bedrock (Reference 3). Regardless of the source of VOCs in this monitoring well, it should be noted that monitor wells located hydraulically upgradient, crossgradient and downgradient of MW-15 do not contain concentrations of VOCs, indicating that the presence of VOCs in MW 15 is a localized phenomenon and that VOCs are not migrating off of Owens Corning property in this area.

Based on the groundwater quality data and biogeochemical indicator data, it is interpreted that dissolved VOCs in site groundwater represent residual concentrations from SWMU 9 and
SWMU 1. SWMUs 1 and 9 were removed from service and stabilized through over-excavation of impacted materials above the water table. Therefore, primary sources of VOCs in groundwater may continue to naturally attenuate over time.or further corrective actions may be warranted prevent contaminated groundwater to migration. Data indicates that contaminated groundwater at SWMU 1 and SWMU 9 is stabilized therefore groundwater is considered under control.

References:

Description of Current Condition Report (Engineering-Science, July 1990) (Reference 1);

_ Draft Corrective Measures Study (Owens Corning, February 1996) (Reference 2);
_ Final RFI Report (Owens Corning, December 1995) (Reference 3)
_ U.S. EPA RFI Report Approval Letter (Reference 4)
_ 2001 Annual Groudnwater Monitoring (Owens Corning February 2002) (Reference 5)
_ 2002 Annual Groundwater Monioring (ARCADIS G&M, Inc. January 2002) (Reference 6)
_ Site Conceptual Model and Site Monitoring Plan (ARCADIS G&M, Inc. March 2002) (Reference 7)

Supplemental Guidance for Environmental Indicator CA 750, Migration of Contaminated Groundwater Under Control: Groundwater-Surface Water Interactions (Reference 8)

Memorandum on Amended Guidance on Ecological Risk Assessment at Military Bases,

Simon, Ted W., Office of Techncial Services (U.S. EPA Region IV, June 2000) (Reference 9)

Footnotes:
[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

   ___X___ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

   If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

   If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Based on ten years of groundwater monitoring data, the migration of contaminated groundwater appears to have stabilized. As discussed in Question 2, the limited frequency of detections of metals and fluoride in groundwater at the site provides strong evidence that these compounds have not migrated significantly from their historic sources, and since the historic sources of these compounds have been removed through process modifications (including removal of all alloying operations from the facility) and over excavation of impacted soils, there is no reason to believe that migration of these constituents would become a concern in the future.

In regards to VOCs in groundwater at the site, the historic and current data indicate that the downgradient monitoring wells have not been affected by the migration of VOCs and that VOCs in groundwater are generally confined in the following localized areas beneath the site:

- The highest concentration of VOCs continues to be limited to a zone of shallow groundwater at SWMU 9. This zone is located in the southwestern portion of the site, approximately 1,800 feet from the potential discharge point at Betsy Creek. Historic groundwater monitoring data beneath and downgradient of this location does not indicate that these constituents have migrated to the downgradient monitoring points. SWMU 9 was taken out of service and over-excavated to the water table in 1980, effectively removing the source of VOCs to the groundwater. Therefore, there is no reason to believe that conditions will change in the future such that significant migration of these VOCs would occur;

- VOCs are also located in the shallow overburden material downgradient of former SWMU 1, immediately north of Betsy Creek (though at lower concentrations than at SWMU 9). Historic groundwater monitoring data downgradient of this location does not indicate that these constituents have migrated to the monitoring points located along the downgradient property line. Rather, groundwater flow directions indicate the VOCs are discharging to Betsy Creek (this discharge is evaluated in later sections of this form), which serves as a barrier to downgradient migration of the VOCs. SWMU 1 was taken out of service and over-excavated to the water table in 1995, effectively removing the source of VOCs to the groundwater in this area. Therefore, it is expected that concentrations will decrease in the future since the source area has been removed.

- A localized zone of VOCs is present in bedrock at MW15, located within the northern section of the OC site. The presence of VOCs in this monitoring well are difficult to explain based on the fact that 1) OC operations were not conducted in this area, 2) VOCs are not present in other top of rock or bedrock monitoring wells in this area, and 3) groundwater flow is from the northwest to east-southeast, onto the OC site towards Betsy Creek. However, regardless of the source of these VOCs in bedrock, groundwater monitoring data downgradient of this location (MW 25 and MW 16) does not indicate that these constituents have migrated to the downgradient monitoring points.

Therefore, the groundwater quality and hydrogeologic data suggest that the migration of contaminated groundwater has stabilized and no VOC's were reported along the perimeter wells at the OC Anderson site.

[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

**X** If yes - continue after identifying potentially affected surface water bodies.

If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Yes, groundwater beneath the site discharges to Betsy Creek in the northeastern portion of the Anderson site. This interpretation is based on surface water data that indicate VOCs are entering the creek and the interpretation of groundwater flow at the site. The groundwater elevation data collected at the site in 2002 demonstrates that groundwater discharge is to Betsy Creek, the localized first-order stream in this area (References 6 and 7). This interpretation of groundwater flow is consistent with the LeGrand-Heath model of groundwater flow in the Piedmont (Reference 7).

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

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_____ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

**X** If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

To provide a conservative evaluation of whether the discharge of VOCs in groundwater to Betsy Creek is likely to be insignificant, the maximum concentration of each constituent in monitoring wells located adjacent to Betsy Creek from the 2001 and 2002 monitoring programs (References 5 and 6) were evaluated to determine if these VOCs are present at concentrations less than 10 times the appropriate groundwater "level," (in this case MCLs). Groundwater monitoring of the VOC plume migrating towards Betsy Creek can be represented by groundwater quality data from shallow overburden wells MW11 and MW12 and top of rock well MW13, which are located proximal to and upgradient of Betsy Creek. These data provide a conservative evaluation of the potential significance of the VOC plume discharging to surface water because these data represent groundwater quality prior to further attenuation associated with migration to the discharge point and entry into the groundwater-surface water/sediment interaction zone.

The 2001/2002 groundwater and surface water quality data indicate that the VOCs carbon tetrachloride, chlorobenzene, tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-TCA, 1,1-DCE, 1,2-dichloroethane (DCA) and vinyl chloride are present in site groundwater that is potentially discharging to surface water as a diffuse plume or intermittent groundwater seep/spring. The maximum concentration of each constituent detected during 2001 and 2002 in groundwater monitoring wells MW11, MW12 and MW13 are summarized below:

| Constituent | MW Conc. | 10 times MCL | |
|---|---|---|---|
| Carbon Tetrachloride | 0.013 mg/L | is less than | 0.05 mg/L |
| Chlorobenzene | 0.004 mg/L | is less than | 1.0 mg/L |
| Chloroform | 0.014 mg/L | is less than | NA |
| 1,1-DCE | 0.630 mg/L | is greater than | 0.07 mg/L |
| 1,2-DCA | 0.004 mg/L | is less than | 0.05 mg/L |
| PCE | 0.002 mg/L | is less than | 0.05 mg/L |
| TCE | 0.001 mg/L | is less than | 0.05 mg/L |
| Vinyl Chloride | 0.022 mg/L | is greater than | 0.02 mg/L |

Therefore, the discharge of VOCs from groundwater to surface water would be expected to be insignificant for carbon tetrachloride, chlorobenzene, 1,2-DCA, PCE, and TCE (all present at concentrations less than 10 times their respective MCL) (Reference 8). Additionally, while chloroform does not have an MCL this constituent has never been detected in any of the surface water samples so it is considered insignificant.

This initial screening of groundwater concentrations against their MCLs indicates that the discharge of 1,1-DCE and vinyl chloride to Betsy Creek may potentially be significant. It should be noted that the vinyl chloride concentration in groundwater is only slightly above 10 times its MCL and that vinyl chloride has never been detected in surface water samples at above 10 times its MCL. Further, the concentration of 1,1-DCE in surface water, other than surface water samples collected at location SW-3A (Reference 7), has never been above 10 times its MCL.

Neither 1,1-DCE nor vinyl chloride is present at concentrations greater than 100 times their respective MCL.

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction
(e.g. hyporheic) zone.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

**X** If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR
2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s):

To assess the potential significance of the VOC discharges to Betsy Creek an expanded surface water monitoring program was implemented in 2002. This program was expanded to address comments presented by South Carolina Department of Health and Environmental Control (SCDHEC) to the U.S. EPA in January 2002 and at a meeting on October 22, 2002. To support this surface water monitoring program, an inspection of Betsy Creek was conducted on March 21, 2002 to determine if additional seeps/springs that should be sampled exist (Reference 7). Five additional surface water sampling locations were identified at that time. A sixth additional surface water monitoring point was added to the monitoring program after a meeting with U.S EPA and SCDHEC on October 22, 2002 (Reference 6).

The results of the expanded 2002 annual surface monitoring indicated that VOCs were below detectable concentrations in nine of the eleven samples collected. The only VOC detected in surface water was 1,1-DCE at 5.2 micrograms per liter (ug/L) in SW-3A and 7.5 ug/L in SW14 Vinyl chloride was not detected in any of the eleven 2002 surface water samples. The two surface water samples with detectable concentrations of 1,1-DCE are from small tributary areas on the north side of Betsy Creek that are associated with seep or spring discharge of groundwater to surface water. The groundwater discharging to this north side of Betsy Creek is influenced by groundwater migrating downgradient of the SWMU 1 area, represented by groundwater quality in MW11, MW12 and MW13. The data from the other nine surface water sampling locations, including several which are immediately downgradient of SW-3A and SW-14, indicate that concentration of 1,1-DCE in these two small tributary areas rapidly attenuates within Betsy Creek through natural mechanisms (biodegradation, volatilization, dilution). Finally, the concentrations of VOCs in all downgradient off-site sampling locations have been below detectable levels since July 2000.

To further evaluate potential VOCs that might enter Betsy Creek, the concentration of VOCs in monitoring wells adjacent to Betsy Creek (presented in Question 6 above) were conservatively compared to available U.S. EPA Region IV Freshwater Screening Values for Hazardous Waste Sites (Reference 8):

| Constituent | MW Conc. (mg/L) | | Chronic Value (mg/L) | | Acute Value (mg/L) | |
|---|---|---|---|---|---|---|
| Carbon Tetrachloride | | | 0.013 | is less than | 0.352 | 3.52 |
| Chlorobenzene | 0.004 | is less than | 0.195 | | 1.95 | |
| Chloroform | 0.014 | is less than | 0.289 | | 2.89 | |
| 1,1-DCE | 0.630 | is greater than | 0.303 | but is less than | 3.03 | |
| 1,2-DCA | 0.004 | is less than | 2.0 | | 11.8 | |
| PCE | 0.002 | is less than | 0.084 | | 0.528 | |
| TCE | 0.001 | | No Standard | | No Standard | |
| Vinyl chloride | 0.022 | | No Standard | | No Standard | |

A review of the groundwater monitoring data indicates that all concentrations in groundwater adjacent to and upgradient of Betsy Creek are less than the U.S. EPA Region IV Chronic and Acute Screening Values calculated for surface water, with the exception of 1,1-DCE. However, the detected concentration of 1,1-DCE in surface water at the OC Anderson site has always been less than the Chronic Screening Value. Therefore, the discharge of groundwater containing VOCs to

Betsy Creek should not be considered significant.

Another indicator that the discharge of VOCs in groundwater is not significantly affecting Betsy Creek is the fact that no VOCs have been detected in previous sediment sampling events at the OC site (Reference 3). The sedimentary environment acts a buffer between the groundwater and surface water, providing significant attenuation potential. Sedimentary environments contain large populations of microbial communities and the nutrients necessary to support their biological activity. This level of biological activity provides significant potential to biodegrade the VOCs prior to their transfer from groundwater to surface water, as evidenced by the several

order-of-magnitude decrease in concentrations noted in groundwater monitoring wells adjacent to the creek and surface water within the creek. Additionally, VOC compounds do not bioaccumulate in fish or other aquatic organisms.

Based on this evaluation, the discharge of VOCs to Betsy Creek should be considered insignificant because; 1) concentrations of VOCs in the creek are not above available Region IV screening criteria, 2) volatile nature of the VOCs mean they will not persist in surface water, 3) downgradient surface water data has not contained VOCs above the laboratory method detection limit since July 2000, 4) data indicating there are no VOCs in Betsy Creek sediments indicates the VOCs are not accumulating in the creek and 5) VOCs do not bioaccumulate in fish or other aquatic organisms.

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies (Reference 9).

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems (Reference 9).

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary)
be collected in the future to verify that contaminated groundwater has remained within the horizontal (or
vertical, as necessary) dimensions of the “existing area of contaminated groundwater?”

**X** If yes - continue after providing or citing documentation for planned

activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

If no - enter "NO" status code in #8.

If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

Yes, site monitoring will continue per the requirements of the RCRA Consent Order in place between U.S. EPA and Owens Corning. This monitoring will include sampling of both groundwater and surface water.

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

**YE** YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Owens Corning Fiberglass facility, EPA ID # SCD 003 349 982, located at Highway 81 South, Anderson, South Carolina. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

NO - Unacceptable migration of contaminated groundwater is observed or expected.

IN - More information is needed to make a determination.

| | | | |
|---|---|---|---|
| Completed by | (signature) | | Date |
| | (print) | Channing Bennett | |
| | (title) | Environmental Scientist | |

| | | | |
|---|---|---|---|
| Completed by | (signature) | | Date |
| | (print) | Narindar Kumar | |
| | | EPA Region 4 | |

Locations where References may be found:
Environmental Protection Agency, 61 Forsyth St., Atlanta, GA. 303043

Locations where References may be found:
Environmental Protection Agency, 61 Forsyth St., Atlanta, GA. 303043

Contact telephone and e-mail numbers

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